

**REMARKS**

Support for the amendments to claims 1 and 9 is found at least at paragraphs [0034], [0043], and [0066]. Claims 10 and 14 have been amended to correct inadvertent typographical errors. No question of new matter arises and entry of the amendments is respectfully requested. Applicants submit that these amendments are proper despite the finality of the Office Action because they place the application in condition for allowance and/or place the claims in better form for appeal.

Claims 1 - 17, 19, 21, and 23 - 25 are before the Examiner for consideration.

**Objection to Claims 19 and 21**

Claims 19 and 21 have been objected to as not immediately following the claim from which it depends. To facilitate prosecution of this application, in the Amendment After Final, which was timely filed on March 13, 2003, Applicants canceled claims 18, 20, and 22 so that claims 19 and 21 immediately follow the claims from which they depend. Therefore, Applicants respectfully request reconsideration and withdrawal of this objection.

**Rejection under 35 U.S.C. §112, first paragraph**

Claims 1 – 18 and 23 have been rejected under 35 U.S.C. §112, first paragraph, for lack of enablement. In particular, the Examiner rejects Applicants' arguments and asserts that the specification does not provide enablement for anions in general because there is only a limited number of working examples of anion "A" and none of anion "B". The Examiner further asserts that the prior art indicates that not all copper salts will produce colloidal copper and that undue experimentation would be required to determine suitable anions.

Further to the Amendment After Final filed on March 13, 2003, Applicants respectfully traverse this rejection in view of the following additional remarks.

The Merck Index is one of the most preferred references for skilled chemists. In the 13th edition, 38 cupric compounds (*e.g.*, compound numbers 2651 – 2686) are disclosed and described. According to the Merck Index, these compounds may be separated into “soluble” compounds and “insoluble or slightly soluble” compounds. In particular, the compounds may be separated as follows:

1) Soluble compounds

2651	cupric acetate
2655	cupric borate
2656	cupric bromide
2657	cupric butyrate
2659	cupric chlorate
2660	cupric chloride
2661	cupric chromate(VI)
2662	cupric chromates
2663	cupric citrate
2665	cupric fluoride
2666	cupric formate
2667	cupric gluconate
2668	cupric glycinate
2669	cupric hexafluorosilicate
2671	cupric nitrate
2675	cupric perchlorate
2676	cupric p-phenolsulfonate
2678	cupric salicylate
2679	cupric selenate
2680	cupric selenide
2682	cupric sulfate

2) Insoluble or slightly soluble compounds

2652	cupric acetate, basic
2653	cupric acetoarsenate
2654	cupric arsenite
2658	cupric carbonate, basic
2662	basic cupric chromate
2663	cupric citrate, hemipentahydrate
2664	cupric ferrocyanide
2670	cupric hydroxide
2672	cupric oleate
2673	cupric oxalate
2674	cupric oxide
2677	cupric phosphate
2681	cupric stearate

2683 cupric sulfate, basic  
2684 cupric sulfide  
2685 cupric tartarate  
2686 cupric tungstate(VI).

By way of example, when two bubbles join to form a single bubble, the total surface area is reduced. Because the surface potential of the bubbles is proportional to the surface area of the bubbles, the joined bubble has a reduced surface potential. In a similar manner, small particles in a solution may join to form larger particles and reduce their surface potential. Typically, small particles in solution are joined by the following processes:

- 1) the dissolution of a particle and re-deposition onto another particle, as in recrystallization processes, or
- 2) the collision of two particles.

However, both of these processes destroy colloidal particles. Therefore, a colloidal solution remains a colloidal solution when the compound(s) forming the colloidal solution is insoluble or slightly soluble. Therefore, colloidal cupric solutions may be formed from insoluble or slightly soluble compounds such as those "insoluble or slightly soluble" compounds set forth above and described in the 13<sup>th</sup> edition of the Merck Index.

In addition, it is known that collisions between particles may be reduced or avoided if the particles possess an electric charge. For example, insoluble inorganic salts (*e.g.*, cupric salts) strongly adhere to water molecules through an oxygen atom. The central positive charge of the metal ion causes a dissociation of a hydrogen ion, leaving a hydroxy anion on the particle surface. As a result, most insoluble inorganic salts possess a negative charge.

Based on the above-described well-known chemistry, one of skill in the art would understand that insoluble or slightly soluble cupric salts may form a colloidal solution and would understand that solubility may destroy the colloidal solution since the dissolved moiety may contribute to the growth of insoluble particles, *e.g.*, such as is commonly seen in crystal

growth. Therefore, one of skill in the art reading Applicants' disclosure would readily identify some possible anions for "A" and "B" as follows:

		"A"	"B"
2652	cupric acetate, basic	CH <sub>3</sub> COO	OH
2653	cupric acetoarsenate	AsO <sub>2</sub>	OH
2654	cupric arsenite	HAsO <sub>3</sub>	-
2658	cupric carbonate, basic	CO <sub>3</sub>	OH
2662	basic cupric chromate	CrO <sub>4</sub>	-
2663	cupric citrate, hemipentahydrate	C <sub>6</sub> H <sub>4</sub> O <sub>7</sub>	-
2664	cupric ferrocyanide	Fe(CN) <sub>6</sub>	-
2670	cupric hydroxide	OH	-
2672	cupric oleate	C <sub>18</sub> H <sub>33</sub> O <sub>2</sub>	-
2673	cupric oxalate	C <sub>2</sub> O <sub>4</sub>	-
2674	cupric oxide	O	-
2677	cupric phosphate	PO <sub>4</sub>	-
2681	cupric stearate	C <sub>18</sub> H <sub>35</sub>	-
2683	cupric sulfate, basic	SO <sub>4</sub>	OH
2684	cupric sulfide	S	-
2685	cupric tartarate	C <sub>4</sub> H <sub>4</sub> O <sub>6</sub>	-
2686	cupric tungstate(VI)	WO <sub>4</sub>	-

In view of the above, Applicants respectfully submit that the present invention is sufficiently enabled and respectfully request that this rejection be reconsidered and withdrawn.

**Rejection under 35 U.S.C. §112, first paragraph**

In the Advisory Action dated April 1, 2003, the Examiner indicates that Applicants' response in the Amendment After Final filed on March 13, 2003 has overcome the rejection under 35 U.S.C. §112, second paragraph relative to the hydrocarbon and aromatic group limitations (emphasis added). However, Applicants respectfully submit that the rejection of the hydrocarbon and aromatic group limitations is set forth in the rejection of claims 1 – 18 and 23 under 35 U.S.C. §112, first paragraph issued in the Office Action dated December 13, 2002. Applicants therefore believe that the Advisory Action contains an inadvertent typographical error and that the Examiner intended to indicate that the rejection of claims 1 -

17 and 23 under 35 U.S.C. §112, first paragraph has been overcome by Applicants' arguments submitted in the Amendment After Final filed March 13, 2003.

However, if Applicants are incorrect and the rejection of claims 1 - 18 and 23 under 35 U.S.C. §112, first paragraph is maintained, Applicants rely on the arguments set forth in the Amendment After Final filed on March 13, 2003 to respectfully traverse this rejection.

With respect to claim 18, Applicants submit that this claim was canceled in the Amendment After Final filed on March 13, 2003, thereby rendering any rejection to this claim moot.

**Rejection under 35 U.S.C. §112, second paragraph**

In the Advisory Action dated April 1, 2003, the Examiner indicates that Applicants' arguments submitted in the Amendment After Final filed on March 13, 2003 were sufficient to overcome this rejection. Accordingly, Applicants wish to submit no further comments with respect to this rejection at this time.

**Rejection under 35 U.S.C. §112, second paragraph**

Claims 1, 6 - 10, and 14 - 25 have been rejected under 35 U.S.C. §112, second paragraph, as being incomplete for omitting essential steps. In particular, the Examiner asserts that the purifying step in the amended claims does not appear to remove any impurities or otherwise separate the substance from the impurities because the specification indicates that after the oxidizing agent and H<sub>3</sub>PO<sub>4</sub> are added, the pH is adjusted to 3, the solution is heated, and the solid precipitate is removed by filtration. The Examiner notes MPEP §2172.01.

To facilitate prosecution of this application, Applicants have amended independent claims 1 and 9 as set forth above to further define the purification step as suggested by the

Examiner. Applicants submit that amended claims 1 and 9 adequately describe the purification of the  $\text{Cu}^{2+}$  solution. Therefore, Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

**Rejection under 35 U.S.C. §102(b)/103(a)**

The Examiner has rejected claims 1 – 8 under 35 U.S.C. §102(b)/103(a) as being anticipated by, or in the alternative, obvious over Brasch (U.S. Patent No. 4,681,630), claims 1 – 8, 17, 18, and 23 under 35 U.S.C. §102(b)/103(a) as being anticipated by, or in the alternative, obvious over WO 96/10918, claims 1 – 8 and 17 – 25 under 35 U.S.C. §102(b)/103(a) as being anticipated by, or in the alternative, obvious over Casale (Abstract), and claims 1 – 8 under 35 U.S.C. §102(b)/103(a) as being anticipated by, or in the alternative, obvious over Paal et al. (Abstract) or Bannigan, Jr. (U.S. Patent No. 4,253,843). In particular, the Examiner asserts that each of the cited references teach a colloidal cupric compound of the present invention.

In addition to the arguments presented in the Amendment After Final submitted on March 13, 2003 traversing these rejections, Applicants respectfully submit the following remarks.

As described in the specification at paragraph [0043], impurities in the starting cupric solution (*e.g.*, ferrous, ferric, and aluminum ions)<sup>1</sup> can be destabilizing factors that flocculate the colloidal particles. For example, a polymer having 1,000 ferric ions may flocculate a  $\text{Cu}(\text{OH})_2$  colloidal particle and one  $\text{Fe}^{3+}$  ion may flocculate  $3 \times 10^7$   $\text{Cu}^{2+}$  ions.<sup>2</sup> In addition,

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<sup>1</sup> Ferrous ions,  $\text{Fe}^{2+}$ , have a high solubility and is slowly oxidized to ferric ions when exposed to the air. On the other hand, ferric ions,  $\text{Fe}^{3+}$ , are extremely insoluble.

<sup>2</sup> Here, it is assumed that the colloidal particle is cubic with one micrometer ( $\mu\text{m}$ ) sides. Thus, the colloidal particle includes approximately  $3 \times 10^7$  cupric ions.

ferric ions may join colloidal cupric compounds by forming bridges, *e.g.*, Cu-O-Fe-O-Cu. Even if ACS grade reagents of Aldrich Chemicals are used, conventional colloidal solutions are extremely unstable. For example, the particle sizes of commercially produced Cu(OH)<sub>2</sub> and CuSO<sub>4</sub>•3Cu(OH)<sub>2</sub> are centered to 3 μm, which suggests that 1 μm particles fall out of solution.

Unlike conventional colloidal cupric solutions, in the present invention, undesirable chemical species such as ferrous ions and aluminum ions are removed from the Cu<sup>2+</sup> solution. As a result, the colloidal cupric compounds according to the present invention are surprisingly stable and do not fall out of solution or separate into a supernatant and cupric precipitate. Therefore, Applicants again submit that the inventive colloidal cupric compound possesses unexpectedly superior stability. In this regard, Applicants respectfully direct the Examiner's attention the executed Declaration under 37 C.F.R. §1.132 attached hereto<sup>3</sup> and to the amendments made above to independent claim 1, which recites that the inventive colloidal cupric compound does not fall out of solution. Applicants submit that none of the Examiner's cited references teach or suggest a colloidal cupric compound that is extremely stable and which does not fall out of solution as presently claimed.

Additionally, the colloidal cupric compounds of the present invention may be used as a plant fungicide. (*See, e.g.*, the specification at paragraphs [0038] and [0075] - [0081]). A cupric ion as a solute can pass through a cell membrane and reach the nucleus to damage the cell's physiology. On the other hand, it is difficult for a colloidal particle to invade to a cell by passing through the cell membrane. Therefore, the colloidal cupric compound of the present invention enters the plant through the stoma. As a result, the colloidal cupric compound exerts less toxicity to the plant than a soluble cupric ion. This additional

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<sup>3</sup> The unexecuted Declaration under 37 C.F.R. §1.132 was submitted in the Amendment After Final filed on March 13, 2003

unexpected feature of lowered toxicity can be seen in Example 10 described in paragraphs [0075] – [0081] of the specification.

In Example 10, 4 trays of tomato seedlings were observed. Tray 1 contained control seedlings with no fungicide or colloidal copper citrate solution, Tray 2 contained tomato seedlings with *Fusarium spp.*, Tray 3 contained tomato seedlings that were sprayed with a colloidal copper citrate solution, and Tray 4 contained tomato seedlings that were sprayed with a colloidal copper citrate solution and *Fusarium spp.* The plants in Trays 3 and 4 resisted *Fusarium spp.* and no toxicity due to the colloidal copper citrate was observed. Thus, Applicants submit that the colloidal cupric compounds of the present invention have a reduced toxicity to plants and are non-obvious and patentable for this additional reason.

In view of the above, Applicants submit that the colloidal cupric compounds of present invention are unexpectedly stable (*e.g.*, the colloidal cupric compound does not fall out of solution) and have a reduced toxicity and are not anticipated by, or obvious over, the cited references for at least these reasons. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw these rejections.

## **CONCLUSION**

In light of the above, Applicants believe that this application is now in condition for allowance and therefore request favorable consideration.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.




If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By

  
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